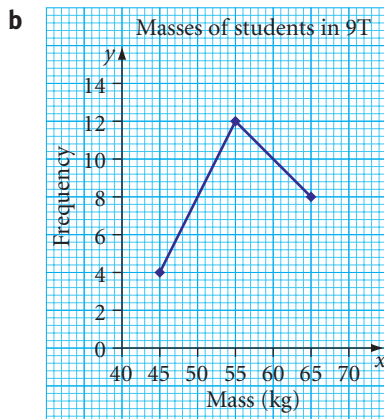# Answers to Coursebook exercises

19 Interpreting and discussing results

◆ Exercise 19.1   Interpreting and drawing frequency diagrams

1 a

Mass, m (kg)	Frequency	Midpoint
$40 \leq m < 50$	4	45
$50 \leq m < 60$	12	55
$60 \leq m < 70$	8	65

b

Masses of students in 9T

c 24   **d** $\frac{2}{3}$

2 a 50 at each surgery

b

| Oaklands Surgery			Birchfields Surgery		
Time, t (minutes)	Frequency	Midpoint	Time, t (minutes)	Frequency	Midpoint
$0 \leq t < 10$	25	5	$0 \leq t < 10$	8	5
$10 \leq t < 20$	10	15	$10 \leq t < 20$	14	15
$20 \leq t < 30$	12	25	$20 \leq t < 30$	17	25
$30 \leq t < 40$	3	35	$30 \leq t < 40$	11	35

c

Waiting times at two doctors' surgeries
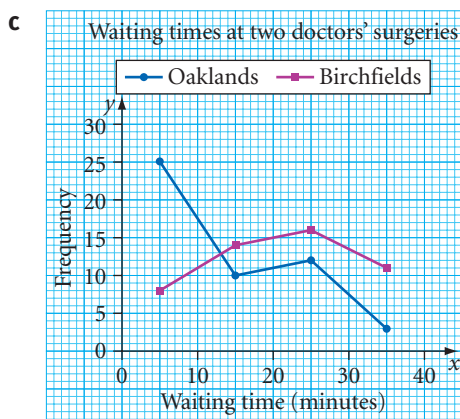
d Over three times as many people had to wait less than 10 minutes in Oaklands surgery compared to Birchfields. More people had to wait over 10 minutes in Birchfields surgery compared to Oaklands.

3 a

Number of hours year 9 students spend doing homework each week

b More girls spend between 0 and 4, and 12 and 20 hours doing homework each week, whereas more boys spend between 4 and 12 hours doing homework each week.

c 40 boys and 50 girls

d No, as there were 10 more girls than boys surveyed. There should have been the same number of boys and girls in order to make a fair comparison.

Exercise 19.2 Interpreting and drawing line graphs

1 a

Monthly rainfall in Lima, Peru
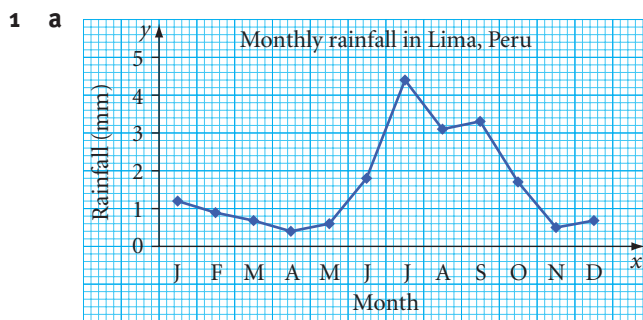
b Example: Rainfall decreases steadily from January to April, then increases between April and July. Apart from an increase between August and Spetember there is a steady decrease between July and November. The year finishes with a small increase between November and December.

c June and July

2 a

Number of tourists worldwide
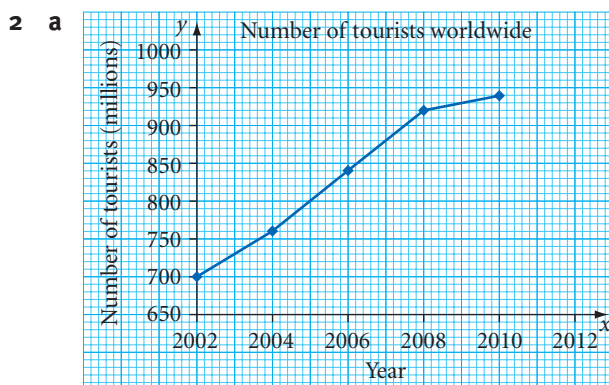
b Number of tourists is increasing each year. The number increased at a similar rate between 2002 and 2008, then from 2008 to 2010 it increased at a smaller rate.

c 880 million

d Answer between 950 and 970 million

3 a

Daily temperatures recorded in Athens in one week
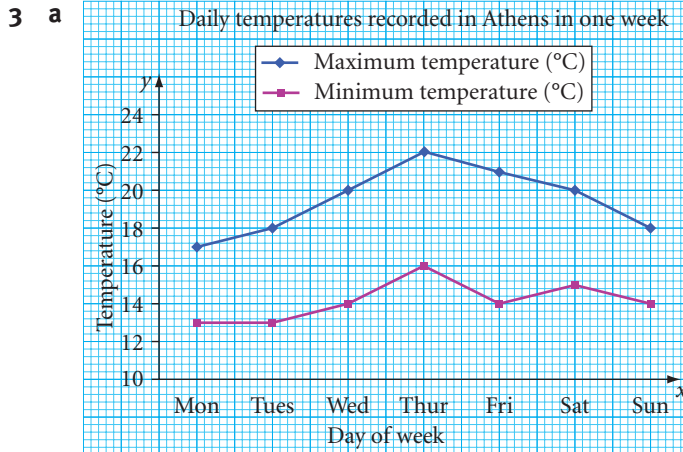
b For example: The maximum temperatures increased gradually during the week, peaked on Thursday, then gradually decreased for the rest of the week. The minimum temperatures started increasing from Tuesday, peaked on Thursday, dropped back down on Friday and Sunday, with a slight increase on Saturday.

c Friday

4 a 43 million **b** 1998 and 2000 **c** 2000 and 2002

d No because the graph is increasing and decreasing by different amounts. There is no real pattern to the figures.
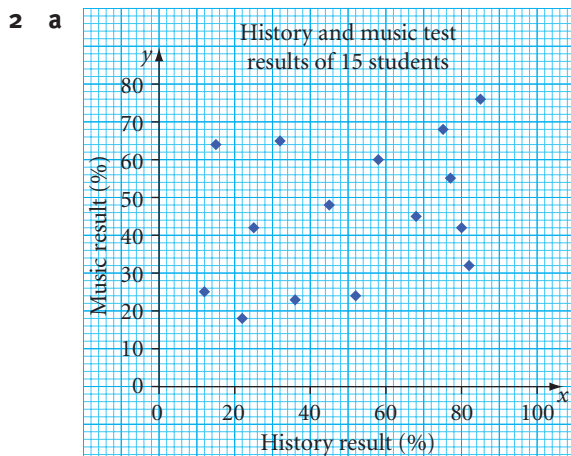
5 a Mass is increasing every year. **b** Age 10 and Age 12 **c** 50 kg

d No because by age 18 a girl should be almost fully grown. You cannot tell whether she will put on more mass or stay the same.

◆ Exercise 19.3 Interpreting and drawing scatter graphs

1 a

Hours spent by students doing homework and watching TV
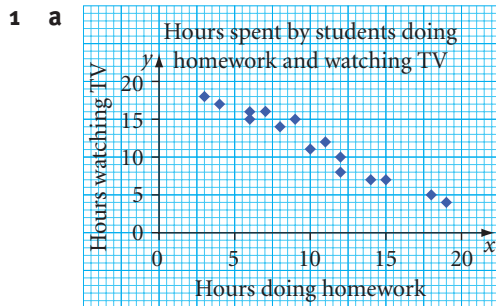
b Negative correlation. The more homework the students does, the less TV they watch.

2 a

History and music test results of 15 students

b No correlation. Getting a good result in one subject doesn't mean a student will get a good, or bad, result in the other.

3 a

Temperature and number of cold drinks sold over a 14 day period
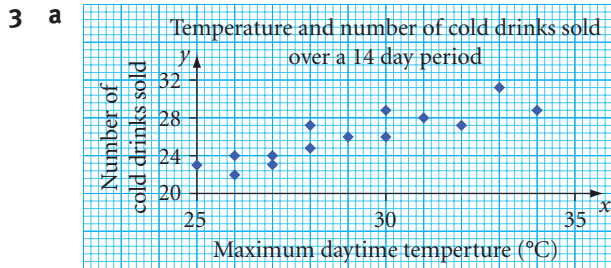
b Positive correlation. The higher the temperature the more cold drinks were sold.

4 a Positive correlation. The greater the distance, the longer the journey took.

b 6 km in 16 minutes. It should have taken less time, so the taxi may have been delayed in traffic.

◆ Exercise 19.4 Interpreting and drawing stem-and-leaf diagrams

1 a

Beach car park						City car park				
				3	0	4	9			
7	6	6	6	5	4	2	5	5	5	7
	9	7	7	6	5	4	6	9		
2	2	1	0	0	6	8	8	9		

Key: For the Beach car park, 5 | 4 means 45 ice-creams
For the City car park, 3 | 0 means 30 ice-creams

b

	i Mode	ii Median	iii Range
Beach car park	46	57	17
City car park	45	46	39

c For example: On average Antonino had better sales at the Beach car park. His median was higher. This shows that 50% of his daily sales were 57 ice-creams or more, compared to only 46 for the City car park. His mode was also higher. The range was smaller, showing that his sales were more consistent, however it was at the City car park where he had his highest daily sale of 69 ice-creams.

d For example: No, Antonino's sales were better at the City car park as he had a higher median and mode and sales were more consistent.

2 a

	i Mode	ii Median	iii Range	iv Mean
Boys' times	17.4 s	16.3 s	2.9 s	16.56 s
Girls' times	16.8 s	17.5 s	4 s	17.72 s

b For example: On average the boys ran faster than the girls, as their mean and median were lower. The girls had the fastest modal time, but they had a larger range showing that their times were more varied than the boys.

c For example: No, as the girls mean and median are both slower. This shows that on average the boys are faster.

3 a

Website A								Website B					
						12	8	9					
		4	3	0	0	13	4	6	8				
8	7	6	5	5	5	2	1	14	5	5	5	6	6	8
	9	8	5	3	3	2	2	15	4	5	6	7	7	8
					1	0	16	6	7	8	9		

Key: For Website A, 0 | 13 means 130 hits
For Website B, 12 | 8 means 128 hits

b

	i Mode	ii Median	iii Range	iv Mean
Website A	145	147	31	147.1
Website B	145	148	41	149.9

For example: Website A and Website B both had the same mode and almost the same median. The median for Website B was only one more than Website A, so this average is almost the same. The mean was also very similar with only a difference of 2.8 hits per day. So on average Website B had slightly more hits than Website A. Website B's range is a lot higher than Website A, showing that the number of hits it had per day varied a lot more.

c Example: They could use either website. Website A was more consistent. Website B was only slightly better on average than Website A.

◆ Exercise 19.5 Comparing distributions and drawing conclusions

1 For example: The heights of the Stage 7 students are more varied. There were no Stage 8 students between 120 cm and 130 cm tall, compared with three Stage 7 students. The greatest difference was between 160 cm and 170 cm tall where there were nine more Stage 8 students than Stage 7 students.

2 For example: The number of goals scored at home matches was less varied than at away matches i.e. they were more consistent at home. The greatest number of goals they scored at a home match was 5 (twice), compared to 4 (once) at an away match. They never scored less than 2 goals at a home match, whereas at 9 away matches they scored less than 2 goals.

3 a For example: The scatter graph showing monthly milk production and average daytime temperature has positive correlation. The scatter graph showing monthly milk production and average rainfall has negative correlation.

b Yes, because the graphs show that in warmer months more milk is produced, and in wetter months less milk is produced.

c

	Mode	Median	Range	Mean
2010	59 000	59 000	20 000	63 000
2011	52 000	61 000	17 000	60 700

For example: Claude is correct because the mean milk production was higher in 2010 than 2011, so on average his cows produced more milk per month. Although the median was higher in 2011, there were a few months when milk production was low and so the overall mean was less than for 2010. The range in 2011 was less than 2010, which means that milk production in 2011 was more consistent.

4 a For example: In 1960 there were more people aged under 40 years in the village, compared to 2010. In 2010 there were 8 people in the village over the age of 80, compared with none in 1960. There were nine times as many people aged 60 to 80 in the village in 2010 as there were in 1960.

b In 1960, 37 were over the age of 40 out of 158 altogether, $\frac{37}{158} \times 100 = 23.4\%$ (approx 25%)

In 2010, 96 were over the age of 40 out of 162 altogether, $\frac{96}{162} \times 100 = 59.3\%$ (approx 60%)

Yes they are correct.

c For example: People are living longer, so there are more people in the older age ranges. The number of young people may be declining as they move to towns or cities to look for work.
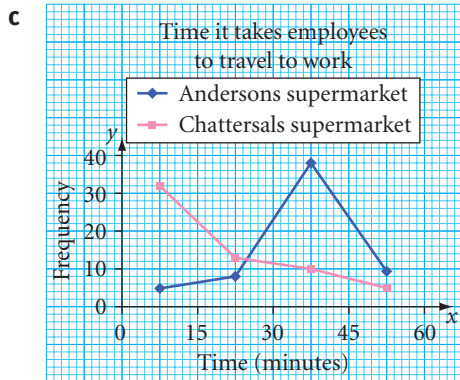
End-of-unit review

1 a 60

b

Andersons Supermarket			Chattersals Supermarket		
Time, t (minutes)	Frequency	Midpoint	Time, t (minutes)	Frequency	Midpoint
$0 \le t < 15$	5	7.5	$0 \le t < 15$	32	7.5
$15 \le t < 30$	8	22.5	$15 \le t < 30$	13	22.5
$30 \le t < 45$	38	37.5	$30 \le t < 45$	10	37.5
$45 \le t < 60$	9	52.5	$45 \le t < 60$	5	52.5

c

Time it takes employees to travel to work

d For example: More than 6 times as many employees took less than 15 minutes to travel to work to Chattersals than Andersons, whereas nearly 4 times as many took between 30 and 45 minutes to travel to Andersons than Chattersals. Only 5 employees (8%) from Chattersals took longer than 45 minutes to travel to work, compared with 9 employees (15%) from Andersons.

2 a

Number of visitors to a theme park
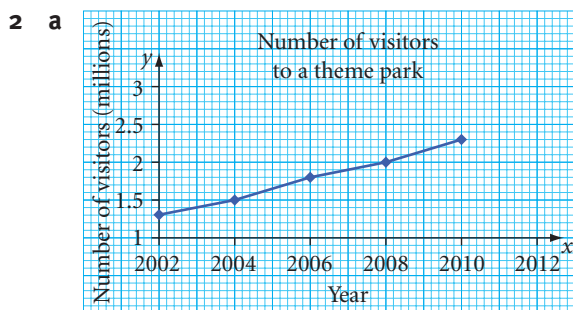
b Visitor numbers are steadily increasing.

c 1.65 million

d Answer between 2.5 and 2.6 million (inclusive)

3 a

	i Mode	ii Median	iii Range	iv Mean
Boys times	67 s	69 s	32 s	69.1 s
Girls times	56 s	63 s	32 s	64.5 s

b The range is the same for the boys and the girls so they are both as varied as each other. The median and the mean for the boys and girls are all over 60 seconds. The boys' mean and median are higher than the girls'. The girls' mean and median are closer to 60 seconds. The girls' mode is only 4 seconds under 60 seconds, whereas the boys' mode is 7 seconds over 60 seconds.

c No, the boys' median is higher, but is further away from 60 seconds, as is their mean, so the boys are worse at estimating 60 seconds.